GEOGRAPHIC SCHOOL BULLETINS

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CHARLES W. HERBERT, WESTERN WAYS

NAVAJOS REVERE CORN, believe their ancestors sprang from its varicolored ears

► New Horizons for the Navajos
► Monument Valley's Fantasy in Stone
► NICKEL—Everyday Wonder
► New Zealand Mirrors Great Britain
► 50 Years Ago: First Flight in Canada

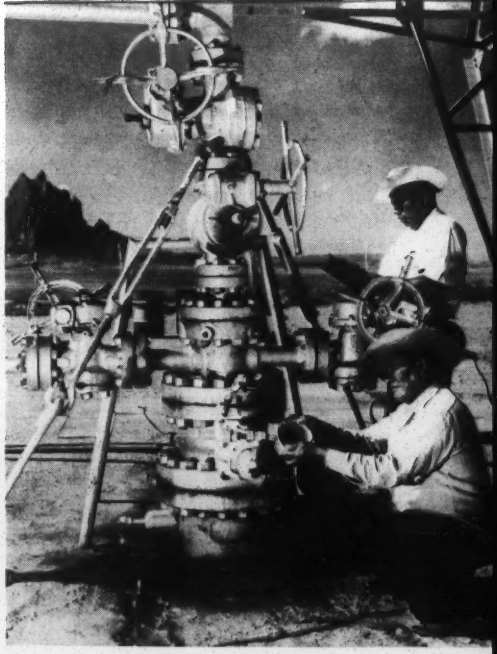
UMI

flocks with pedigreed rams, construct sawmills. And Navajos, who once refused schooling, attended 40 colleges and universities across the country.

Their tuition money, like all the tribal income, is administered by the Navajo Tribal Council (bottom), with headquarters at Window Rock, Arizona. The 73-member council includes women, such as Mrs. Annie Wauneka, silver-decked chief's daughter in the right foreground. The mural behind the council members reminds them of a grimmer time—the "Long Walk."

During the Civil War, Kit Carson and a force of 700 volunteers marched on the Navajos to put an end to their raiding. The Indians hid in canyons, but Carson's men killed their sheep, burned their crops, cut down their fruit trees. Without food, the People surrendered. In 1864, the Navajos and their surviving sheep were driven on the Long Walk—300 miles to Fort Sumner, New Mexico. A chief described it in these words:

"Many die. Always hungry, always thirsty. Women carry children. Men tired. Always we walked. We were very tired, very thirsty. Always we walked."



For four unhappy years the People squatted along the Pecos River, nearly starving. Then, after signing another treaty renouncing war, they were escorted back "home"—a reservation carved from their former domain—and given sheep.

PHOTOGRAPHS BY CHARLES W. HERBERT, WESTERN WAYS

The Navajos Learn New Ways

FROM THEIR SUN-WASHED western valleys the Navajos, largest Indian tribe remaining in the United States, are moving out into the mainstream of American life. A nation within a nation, "the People," as they call themselves, are discovering the advantages of the white man's way.

Women still weave their blankets under the towering buttes (pronounced beauts) of Monument Valley (above) while keeping an eye on their source of wool, the sheep flock. After months of work the blankets will go to the trading post to buy coffee, sugar, flour, canned fruit, a bolt of cotton cloth, perhaps soda pop for the family. That will be a red-letter day—but the women's work will net them only about 10 cents an hour.

In contrast, young Navajo technicians on another part of the reservation check the "Christmas tree" of valves atop a helium-bearing natural gas well (below). From gas and oil wells such as these have come much of the impetus that sends the tribe galloping forward.

The Navajo reservation stretches across 25,000 square miles of dry land in the Four Corners country, where Utah, Arizona, New Mexico, and Colorado come together. The land was of little value until its mineral wealth was discovered.

Now money pours in to the tribe—$30,453,525 from oil and natural gas alone in the last fiscal year. Industries have penetrated the reservation. Income from uranium and vanadium brought the People another million dollars.

With these resources, and vastly increased educational opportunities, the tribe has accelerated its development pace. They operate motels, build hospitals, upgrade their

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JACK BREED

NAVAJO MEDICINE MAN invokes the good spirits to aid a sickly boy who sits on an intricate sand painting to absorb its magic power. Many Navajos now demand the white man's medicine, and new hospitals have been built in Tuba City, Shiprock, and Winslow. Others are under construction. Medicine men who suspect serious disease, such as tuberculosis, recommend hospital care. Some Indians, taking no chances, demand both types of treatment.

pledge, a check showed only 11,000 Navajo children getting schooling; 13,000 were not. By 1957, enrollment had swelled to 27,000, with fewer than 3,000 still evading the three R's.

The feat was accomplished by building all kinds of schools—central boarding schools, community boarding schools, Federal day schools, public schools on and off the reservation, and mission schools. Yellow busses call at scattered hogans (below). Finally came schools in trailers, based on the idea "if they can't come to you, you'd better go to them."

Money from oil clothes youngsters whose rags formerly wouldn't have kept them warm enough to study. And the Council has set aside $5,000,000 as a scholarship fund to guarantee that qualified students can attend college.

Educational progress and other aspects of the Navajos' new life are explored in the color-illustrated story "Better Days for the Navajos" in the December, 1958, *National Geographic* ($1).

The National Geographic Society's book *Indians of the Americas* ($7.50) reveals in paintings, photographs, and text the full panorama of Indian life in this hemisphere. F.S.

CHARLES W. HERBERT, WESTERN WAYS

UMI

NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH BAYLOR ROBERTS

Visitors find the reservation so starkly dramatic, with such a stimulating climate, that they are tempted to think "What a heavenly place to live!" The Navajos love it, too; those who have moved to San Francisco, Chicago, or St. Louis remember it with deep homesickness. But to Indians who must try to scrape a living from the dry land, the reservation shows a less handsome face. Much gets only 8 inches of rain a year, and grass has an uphill fight even to survive, much less nourish sheep. Crops can hardly be grown without irrigation.

Now the riches hidden beneath the soil provide new hope for the dwellers in the hogans—the log and mud dwellings traditional with the People (above). There is no furniture except an oil-drum stove with a pipe through the roof, and the loom where grandmother weaves her traditional rug. Around the circular walls are the family's household goods.

The two children, Ernie and Elizabeth, will have opportunities unknown to the older generations. When the Navajos returned from their exile in New Mexico, General William T. Sherman promised them: "Your children shall learn paper."

It was easier promised than done. How could schools be brought to kids living in isolated hogans at the back of beyond? How do you teach children you can't find?

Day schools seemed out of the question, and for a long time the Government simply let the matter drop. The People, for their part, appeared in no hurry to acquire book knowledge.

Pressure mounted among friends of the Indians to "do something," and boarding schools were tried. Government agents scooped up children, almost kidnapped them, and forced them into barracklike schools.

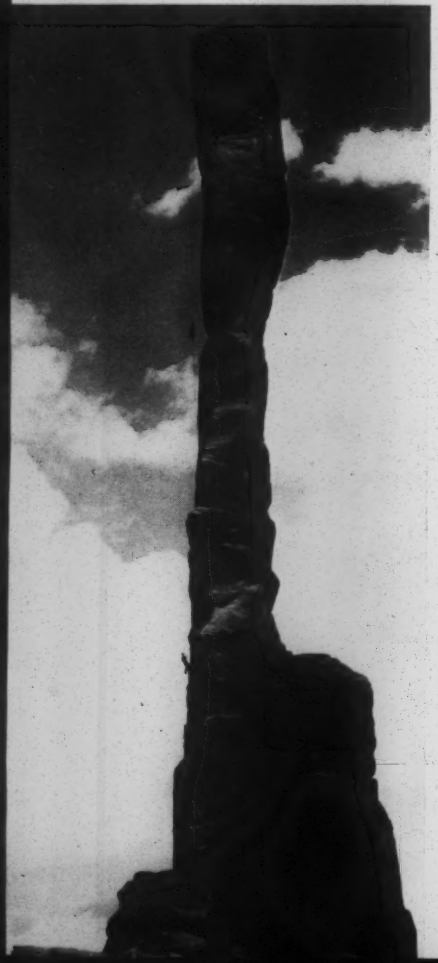
Terrified, the children escaped when they could. Those who stuck it out returned to their families suspect, infected with "foreign" ideas.

World War II changed all that. Many Navajo boys were rejected by the draft because of illiteracy, but 3,600 were accepted. Some became "code talkers" for the Marines—broadcasting in Navajo to the confusion of the Japanese.

When they came home, these experienced Indians told their People what the world is like. After the war, the Tribal Council insisted that the Federal Government keep Sherman's promise.

As late as 1950, when the Government appropriated $88,570,000 to redeem the

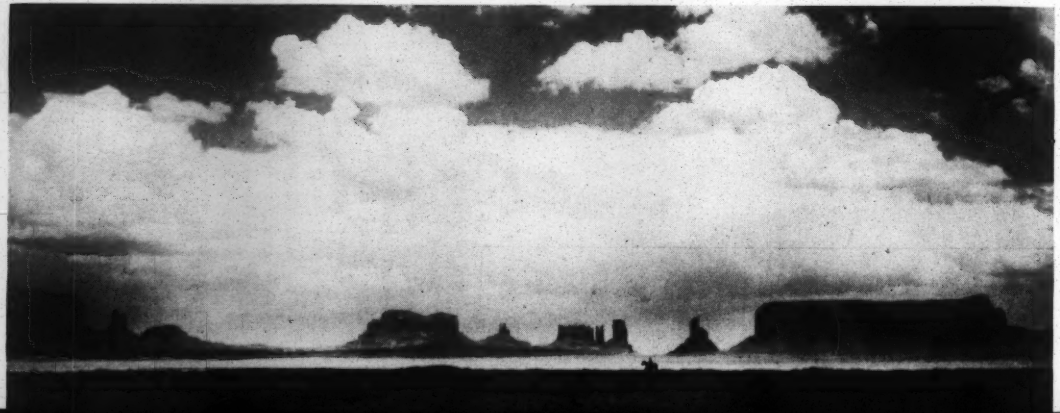
RAY MANLEY

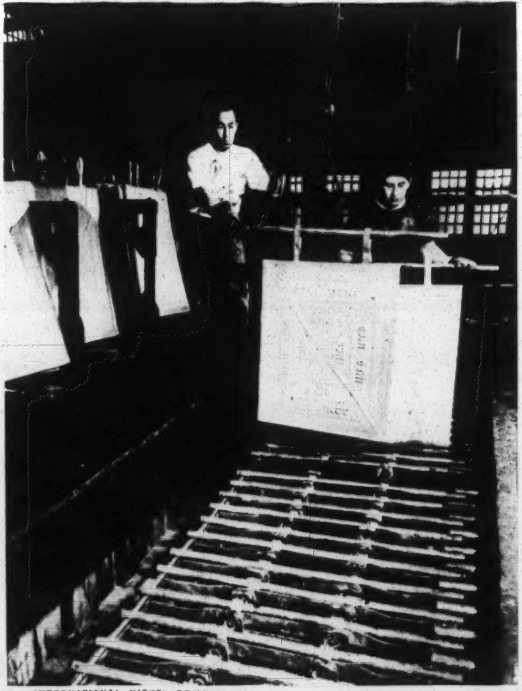


MONUMENT VALLEY

FEW SIGHTS equal Monument Valley. Magnificent as it is, many visitors feel there is more here than meets the eye, that whatever gods the Navajos own must surely dwell in this natural Stonehenge of the Southwest. As the sun sinks along the Arizona-Utah border, the great wind-chiseled slabs of sandstone statuary deepen in color from yellow to red to magenta. A few minutes more and vaulted temples like the Mittens, the Eagle, the Owl, and Elephants Feet seem to burst into flame. But twilight soon purples the desert, the fires fade, and shadows creep across the valley. . . . Totem Pole (left) rises like a minaret. Its limestone-capped peak towers almost as high as that famous man-made memorial—the Washington Monument. In 1957 four intrepid young men drove a succession of steel pins into the spire and hauled themselves up. Here two spiderlike climbers struggle to join their companions already on top. . . . As improved roads snake into Monument Valley, automobiles invade this inner sanctum of the Navajo realm. Hollywood movie companies seek out its stupendous scenery. Scientists solve geologic questions that never bothered the Indians, learning that the valley floor once lay where the mesa tops soar today. Later, volcanic eruptions cracked the earth. Wind and water eroded the land. All but the hardest formations wasted away. A.P.M.

LEFT, CHARLES W. HERBERT, WESTERN WAYS; BELOW, RALPH GRAY, NATIONAL GEOGRAPHIC STAFF





INTERNATIONAL NICKEL COMPANY

99.9 PERCENT PURE nickel emerges from the concrete tanks (left) of the refinery where electrolysis removed nearly all remaining impurities. From here the nickel sheets are cut up into the various sizes manufacturers use, or are melted into ingots and shipped to market. Alloyed, nickel appears in stainless steel products, chemical equipment, storage batteries, fluorescent lights, electric heating equipment, printing plates, and countless other products. At intersections on the road from raw material to finished product, the various minerals removed as impurities are recovered, refined, and marketed.

ducer, is planned to add an annual 75,000,000 pounds after a breaking-in period. Freeport Nickel Company, with a new mine and plant at Puerto Cayo Moa, Cuba, and a refinery in Louisiana, expects to produce another 50,000,000 pounds annually when its facilities are complete next summer.

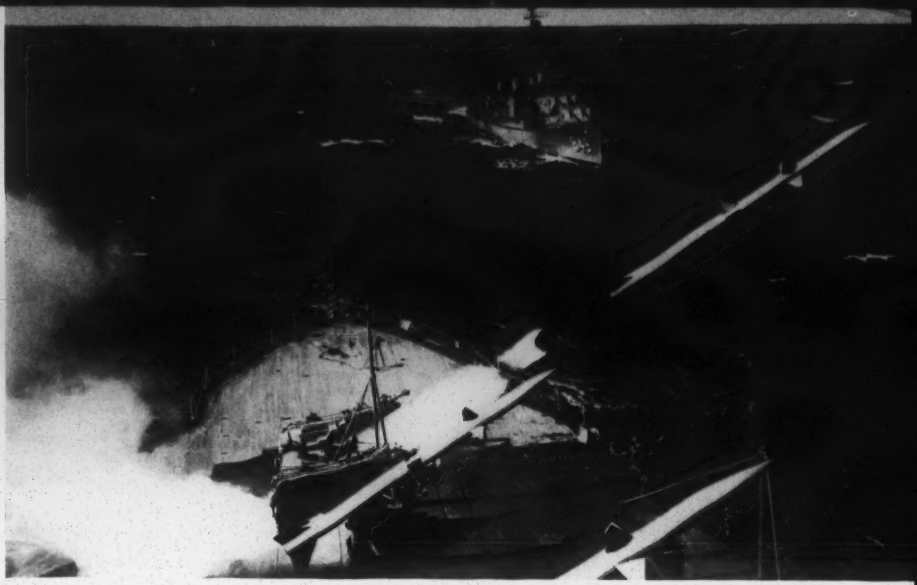
Still the supply will only whet the industrial appetite. Uses for the metal seem infinite. Strong, wear-resistant, and noncorrosive, nickel puts backbone into other metals. The armed forces, among the first to realize the strength of nickel alloys, turned them into gun barrels, armor plate, crankshafts, and radio and television tubes during World War II. The X-15, planned as the first plane to fly a man to the edge of space next summer, wears nickel-chromium alloy armor against the intense heat.

Architects alloy nickel with steel in modern skyscraper construction (right). Thin exterior walls of the metal are light—as well as handsome—permitting a slimmer structural skeleton.

Nickel is the "stainless" in stainless steel. The housewife knows it as tableware and on wall ovens, refrigerators, and dishwashers.

Although refining nickel is a complicated process (above), manufacturers now consider the metal heaven-sent rather than a prank of hell, even though it got its name from "Old Nick"—the devil himself. L. B.

213 SOCONY MOBIL OIL COMPANY



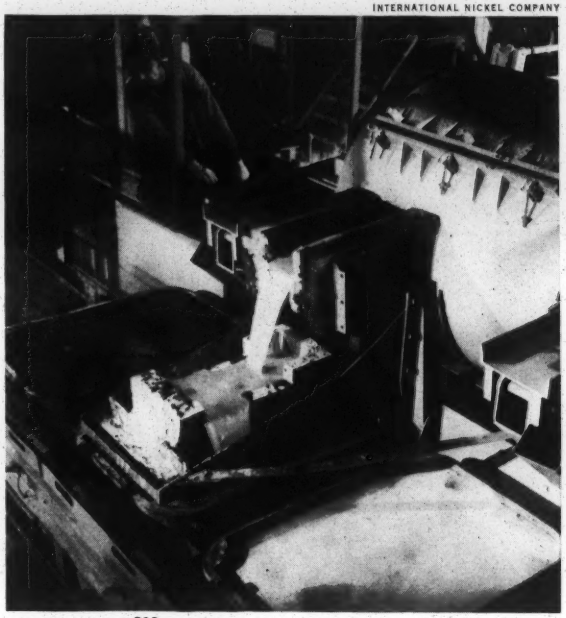
U. S. NAVY

The Everyday Wonder of NICKEL

A NICKEL WON'T buy a cup of coffee anymore. But nickel is priceless. Without the metal, jet planes and guided missiles like the Navy Terriers above would burn up in the friction of high speeds.

It is a far cry from the 19th century when miners cursed as "Devil's Copper" the tough, heat-resistant metal that snagged their smelters, and manufacturers considered it too scarce to make experiments profitable. Science and industry proved them wrong. War and peacetime uses continue to soar. Free World output now totals about 525,000,000 pounds a year. A newly-dug mine in Canada, leading nickel pro-

INTERNATIONAL NICKEL COMPANY



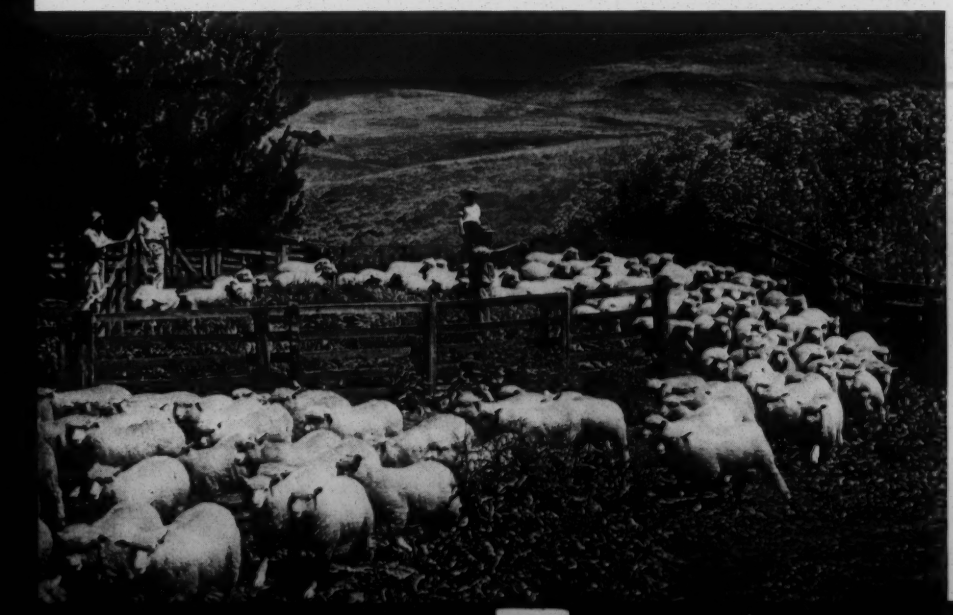
FROM NICKEL MINE to Navy missile is a long, curving road with many intersections. Freshly-mined nickel ore contains rock and such other minerals as copper, iron, sulphur, cobalt, platinum, palladium, gold, and silver. Crushers break the ore into pebbles. Grinders pulverize these nuggets to a powder as fine as flour. Then flotation removes some of the impurities, smelting takes out others. The remaining nickel product is further processed in furnaces and poured into moulds (right). But the resulting slabs still contain a small percentage of impurities and must be refined.

FLAX FARMERS lay out a crop to dry and bleach under the friendly sunshine. This flax thrives in the swamplands as a myriad of other crops bloom all over New Zealand. Nature is so generous with rainfall and sunshine on these small islands—combined they total slightly less than the area of Colorado—that two-thirds of the country is suitable for farming. Pastureland grows lush. Dairy farmers and shepherds seldom buy animal feed. Sheep and dairy products are the chief exports.

Farmers discovered native crops could make them prosperous. For example, they had watched the Maori scrape with mussel shells the sword-shaped leaves of a flax plant. They wove the fiber (above), native only to New Zealand, into clothing, rope, mats, and baskets. Today mills process the flax for wood baling, upholsterers' hemp, and matting.

With the help of mechanization and scientific farming, New Zealand has built up a sound agricultural economy in a little over a century. Three-fourths of the people are connected, either directly or indirectly, with farming. Profits enable the country to import machinery to develop industries in cities, chiefly Auckland. The prosperous countryside has boosted New Zealand's overseas trade to the world's largest per capita.

New Zealand leads all governments in looking after the welfare of citizens. It was the first to provide old-age pensions and social security. Its health program gives babies the best chance in the world to survive the first year. L. B.



PHOTOGRAPHS BY HOWELL WALKER, NATIONAL GEOGRAPHIC STAFF

Great Britain's South Seas Echo

THE SCENERY of New Zealand is about as international as scenery can get in 100,000 square miles. Norwegian fiords (above) cut the southwestern coast. Swiss alps rise from the plains of South Island. Mount Egmont, an extinct volcano on the western promontory of North Island, reminds the visitor of Japan's Mount Fuji. Geysers and boiling springs near the center of North Island resemble Yellowstone and Iceland.

But however cosmopolitan the landscape, the people of these islands have turned much of the country into bits of merry England and bonnie Scotland during the 190 years since Captain James Cook claimed New Zealand for Britain.

The sheep cotes which have made the country the world's third largest exporter of wool dominate the pasture land. Cities with English names—Wellington, the capital, Christchurch, Hamilton—boast typical English gardens and Anglican churches. Isolated 1,200 sea miles from their nearest neighbor, Australia, most of New Zealand's 2,250,000 people live on two main islands.

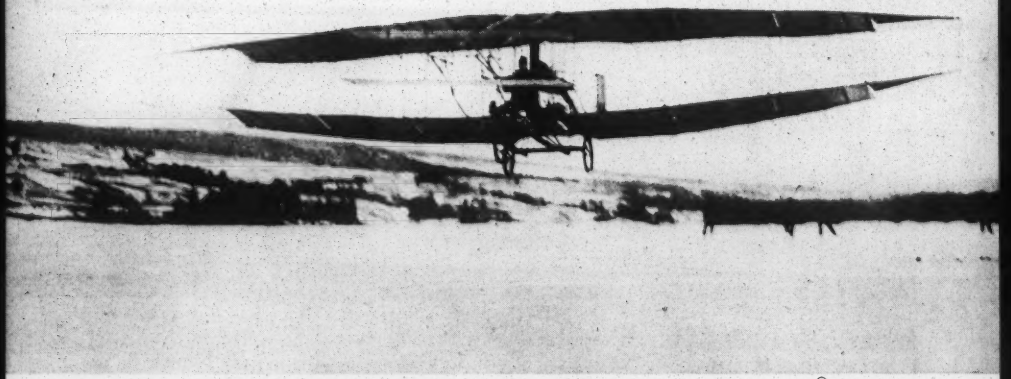
The first who sailed to this opposite corner of the world where the seasons are reversed were lured by tales of rich whaling in the southern Pacific. Then, about 20 years after Americans trekked to California for gold, Englishmen sailed in a New Zealand gold rush. The supply of whales and easy wealth soon petered out. The immigrants settled down to turn the country into an agricultural gold mine.

They could not have chosen a better spot to become sheep rearers (bottom) and dairy farmers. The islands enjoy a temperate climate, plenty of rainfall and an abundance of excellent pastureland.

The farm program slowed temporarily until the newcomers settled land disputes which sometimes exploded into wars with the Maori. These brown-skinned Polynesians beat the white men to New Zealand by some 800 years. Finally peace was won, and today about 140,000 Maori, most of whom live on North Island, enjoy equal rights with other New Zealanders.

With successive immigrations came the need for more food. Wheat and barley fields sprang up on the Canterbury Plains. Fruit orchards bloomed in the south.

First Flight in Canada



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IT WAS A COLD, gray morning on frozen Baddeck Bay, Nova Scotia, but 150 persons, wrapped in wool and anticipation, had come out to see the marvel.

In a flimsy biplane, the daring John A. D. MacCurdy was to attempt to take off from the ice and fly over the bay. Never before had a man flown a plane in Canada—or for that matter, in the entire British Empire, on which in those days the sun never set. Only five years earlier the Wright brothers skidded aloft from the North Carolina sand dunes to start the age of powered flight.

Now, on February 23, 1909, a cloud-breathing horse towed the *Silver Dart* into position, and the motor was warmed up. Rated at 50 horsepower, it sometimes delivered only eight. (Today's four-engine jets, just 50 years later, deliver 150,000 horsepower as they streak along at 600 miles per hour.)

The *Silver Dart* rolled across the ice; a group of skaters kept pace until it lurched into the air. It soared half a mile and landed safely.

The spectators followed, among them a Santa Claus-like figure, white beard flowing in the wind as he rode in a horse-drawn sleigh. He was Alexander Graham Bell, inventor of the telephone, retired president of the National Geographic Society, and a pioneer of powered flight. The triumphant *Silver Dart* was a product of the Aerial Experiment Association, formed by Dr. Bell and four young associates—MacCurdy, Glenn H. Curtiss, F. W. Baldwin, and Lieutenant Thomas E. Selfridge.

From this small start has grown an industry that now adds more than half a billion dollars a year to Canada's national product.

Although it flies high today, the Canadian industry had a hard time getting off the ground. The *Silver Dart* was built at Hammondsport, New York, where Curtiss had an engine plant. After the successful flight, MacCurdy and Baldwin designed several flying machines. Their *Baddeck I*, built on the Bell estate, was the first successful aircraft made in Canada.

Little more was done until World War I, when Canada built 2,000 training planes. Afterwards, the industry sputtered along at low altitude until bugles heralded World War II. It rapidly became one of Canada's largest. Wartime production exceeded 16,000 planes of 21 types.

The aircraft industry today ranks third in total employment among Canadian manufacturers, and eighth in sales. F.S.

UMI